REMARKS

In the above-identified Office Action, the Examiner has objected to the Abstract because it is too lengthy. The Applicant has amended the Abstract so that now it does not exceed 150 words in length.

Claims 1-10 have been rejected as unpatentable over Hoshi in view of Japanese publication to Hiroshi.

Hoshi discloses that "*In a crystal, there are generally two kinds of point defects formed during the crystal growth, i.e., one is vacancy* (V-region) *and the other is self interstitial atom* (I-region)" (Col. 1, lines 29-31).

Hoshi also discloses that *"If this F/G exceeds a certain value, the crystal becomes the V-region, and if F/G is lower than the certain value, the crystal becomes the I-region"* (Col. 1, lines 53-55).

The Abstract of Hoshi states: *"an epitaxial layer is deposited on a silicon wafer sliced from the single crystal ingot and containing no I-region for the entire surface"*; as such, the "no I-region" is equivalent to the "V-region". Further, Hoshi et al discloses methods for producing silicon single crystal so as to contain a V-region in the silicon single crystal (Col. 11, line 18 – Col. 13, line 39).

Meanwhile, the subject invention deals with three types of defects, namely, COP (the V-region in Hoshi et al), OSF, and I-defects (the I-region in Hoshi et al). Further, the subject invention defines a "defect-free silicon monocrystal" as a crystal which is free or substantially free of the three above types of defects (specification: page 1, line 17 – page 2, line 2). Fig. 1 shows an epitaxial defect-free region α 2 where the silicon wafer substrate is free of defects and the epitaxial growth layer is free of defects.

According to an embodiment of the subject application, it is possible to control the concentration of boron and the growth condition V/G so as to not fall below the lower limit LN1, since the lower limit LN1 of epitaxial defect-free region α 2 is determined. As a result, the instant invention makes it possible to manufacture in a good yield high-quality epitaxial silicon wafer which is free of defects in both the silicon wafer substrate and the epitaxial growth layer.

From the above, it is apparent that the subject invention involves a method for producing a silicon wafer that has an epitaxial defect-free region α 2 which contains neither a V-region nor an I-region in the silicon monocrystal; Hoshi et al discloses a V-region which contains defects in the silicon monocrystal.

Therefore, Hoshi et al does not disclose an epitaxial defect free region α 2, where both the silicon wafer substrate and the epitaxial growth layer are free of defects as in the subject invention.

Hiroshi et al discloses a technique to dope 3×10^{18} atoms/cm^3 or more of boron, to make silicon wafer substrate low-resistance.

However, Hiroshi et al does not describe the defect-free region α 2, which is claimed herein. Further, Hiroshi et al does not describe a technique to control the concentration of boron and the growth condition V/G, so as to fall within the defect-free region α 2 and not to fall within the epitaxial defect region β 2 which contains I-defects. Furthermore, Hiroshi et al does not describe the effects derived from the applicant's invention.

Therefore, the invention of the subject application is not taught by the combination of Hoshi et al, which does not teach a silicon monocrystal epitaxial defect-free region α 2, and Hiroshi et al which does not disclose a technique to control the concentration of boron and the growth condition V/G so that it falls within an epitaxial defect-free region α 2.

Applicant has amended claim 9 so that it now recites that the thin film epitaxial growth layer is less than 2 μm on the silicon wafer substrate, thereby clarifying the distinction between the subject invention and Hoshi, which recites an epitaxial layer of 2 μm (Col. 10, lines 64-67). Further, claim 9 has been amended to further bring out the distinctions between Hoshi and the subject invention, in that epitaxial defects are not present on the epitaxial growth layer, even after forming such a layer of less than 2 μm on the substrate with void defects. As a result, applicant believes that claim 9 also recites over the combination of Hoshi and Hiroshi.

In addition to the above, applicant has amended the claims and the specification to correct a typographical error which is apparent to those skilled in the art. An oxygen concentration within a silicon crystal cannot be 12.5 atoms/cm^3, but rather must be 12.5 x 10^{17} atoms/cm^3.

Re-examination and reconsideration are respectfully requested.

With the above amendments and remarks applicant believes that the subject application is ready for allowance and earnestly solicits an early notice of same. Should the Examiner be of the opinion that a telephone conference would expedite prosecution of the subject application, he is respectfully requested to call the undersigned at the below listed number.

Respectfully submitted,

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